SPACECRAFT DESIGN

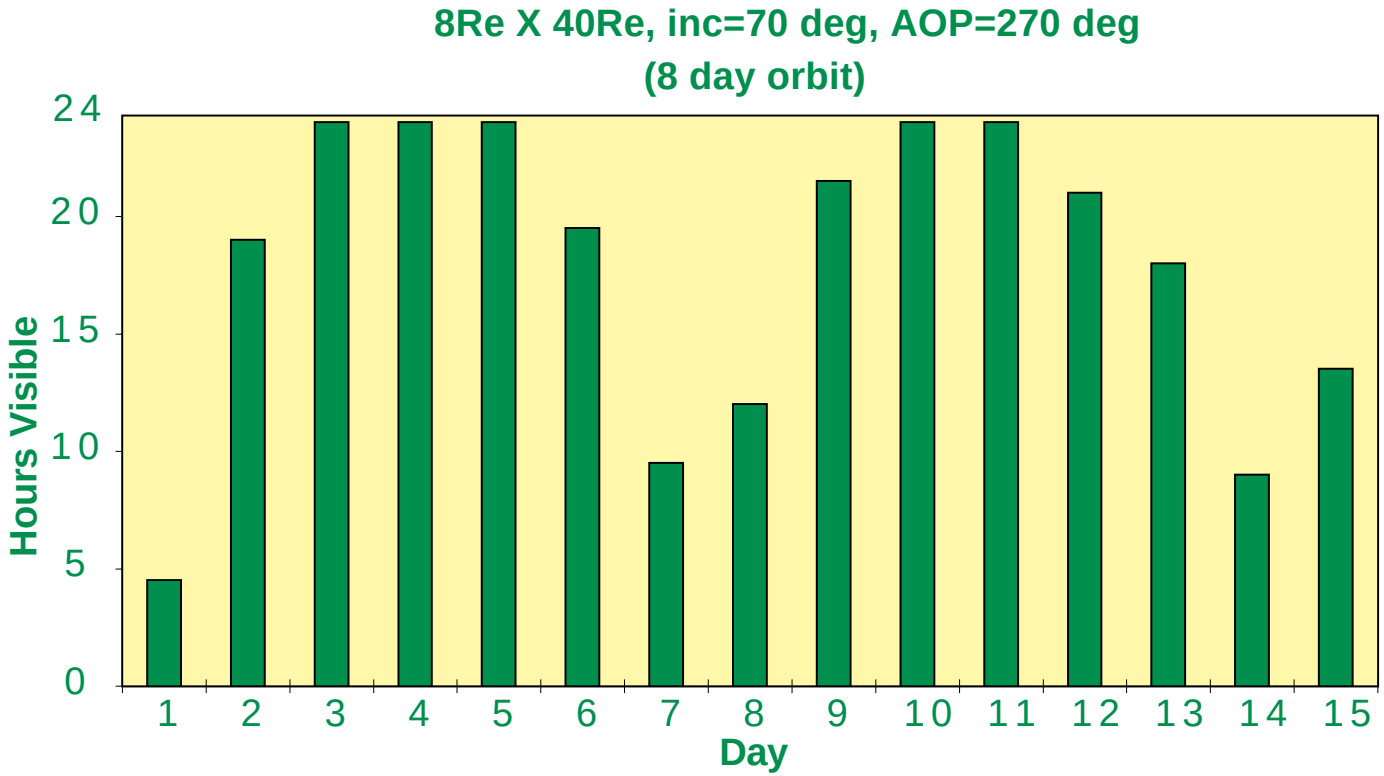
and

MISSION OPERATIONS

SNAP ORBIT

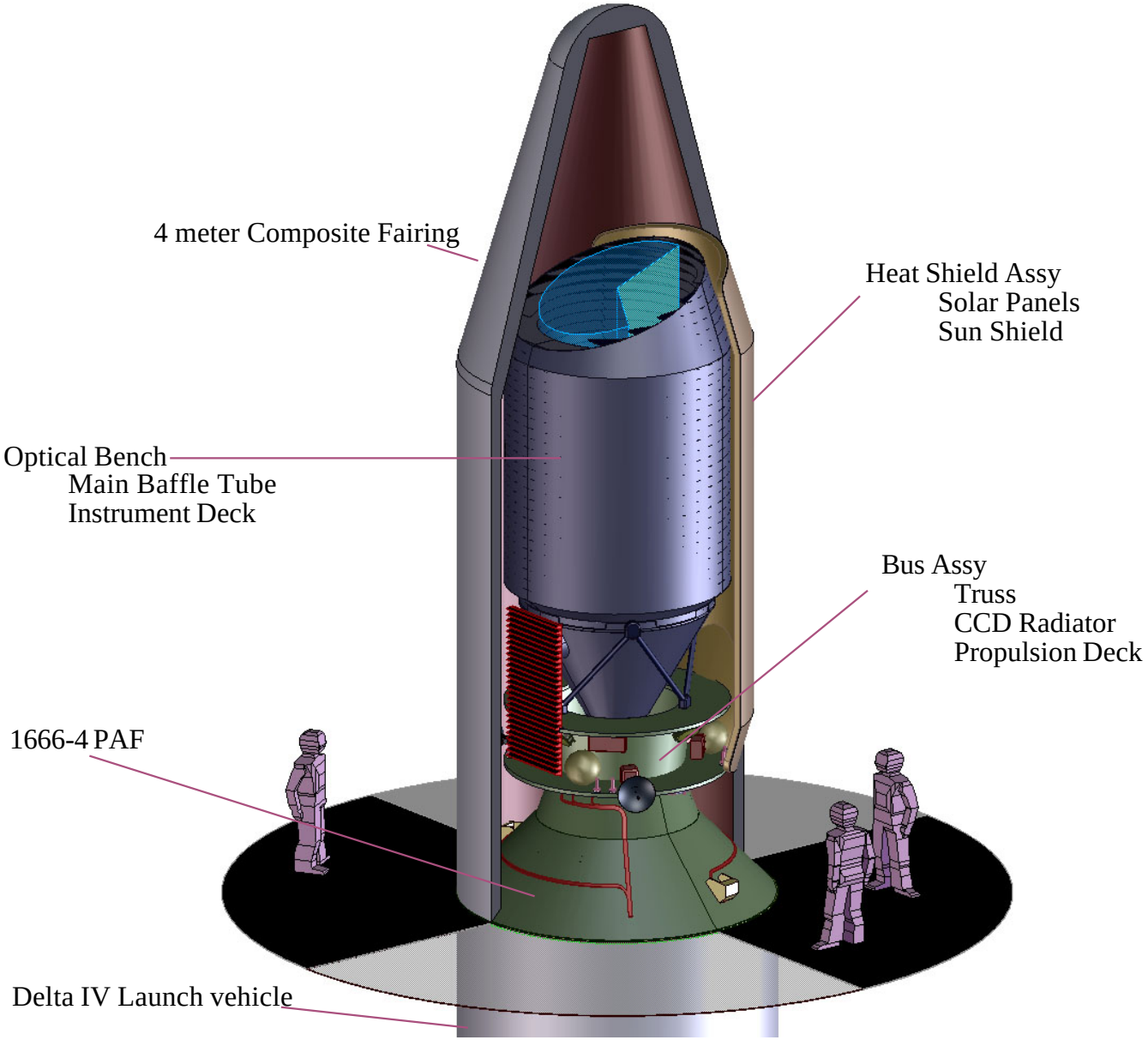
- "Prometheus" Orbit Baselined Following Preliminary Trade Study
- Uses Lunar Assist to Achieve a 14 day (19 X 57 Re) Orbit, or 7 day (8 X 40 Re) Orbit with a Delta III 8930 or Delta IV-M Launch Vehicle
- Good Overall Optimization of Mission Trade-offs
    - Low Earth Albedo Provides Multiple Advantages:
        - Facilitates Passive Cooling of Detectors
        - Minimizes Stray Light in Telescope
        - Minimum Thermal Change on Structure Reduces Demand on ACS
    - Excellent Coverage from Berkeley Groundstation
    - Outside Radiation Belts
    - Orbit Reachable with Available Launch Vehicle

- High northern hemisphere orbit has excellent telemetry: ~ 50 Mbit/s for 19/57 orbit, > 50 Mbit/s for 8/40 orbit
- 8 Gbit (compressed) image every 200s: 40 Mbit/s
- Data content: 1/3 optical images, 1/3 spectroscopy, 1/3 IR photometry



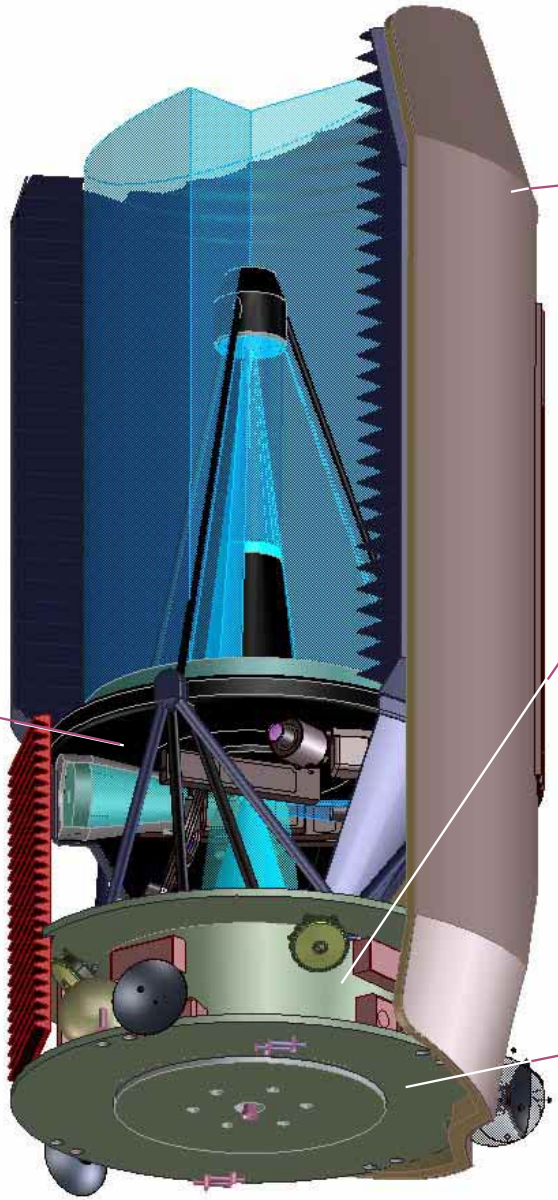
SPACECRAFT DESCRIPTION

- Detailed Design and Specification of S/C will be Done by Industry Teaming Partner
- We have Developed a Strawman Spacecraft to Support Costing, and Payload Layout
  - Power from 4 sq m GaAs cells mounted directly to Sun Shade (No Deployable Arrays Required)
  - Propulsion System Uses Monopropellant Hydrazine
  - Telecom System uses 25W TWTA and 50 cm dish to Achieve 50 Mbit/sec downlink
  - Standard Rad-Hard Processor System will be used for C&DH


4 meter Composite Fairing
Heat Shield Assy
Solar Panels
Sun Shield
Optical Bench
Main Baffle Tube
Instrument Deck
Bus Assy
Truss
CCD Radiator
Propulsion Deck
1666-4 PAF
Delta IV Launch vehicle

ACS System

- Two Ball CT 602 Star Trackers Used for Coarse Tracking
- Fast Read-out CCD in Science Telescope Provides 25 Hz Update Rate for Fine Attitude Sensor
- This System will provide overall Pointing Accuracy/Stability of .03 Arc-Sec (1 Sigma) for Observatory
- Reaction Wheel Package Consists of 4 Each of L3 Micro-balanced RWA-15 Units
- Gyro Package Comprised of Redundant L3 RGA-20 Units with low drift



Space Frame
- Solar Panels
- Sun Shield
- MLI Blanket
- Baffles

BusAssy
- Truss
- Composite shear
- CCD Radiator
- Reaction wheel
- 3 x 50cm dia. Hi-gain GMAs
- 2 x Lo-Gain Antennas
- Transponder
- Battery
- Mass Memory Unit (MMU)
- Spacecraft Control Unit (SCU)
- Power Control Unit (PCU)

Star Tracker
TTL Star Guider
Gyro Assy

Propulsion Deck
- 12 x .5 lbf engines
- 1 x 5.0 lbf engine
- 3 x 47 cm dia. tanks
- Controls

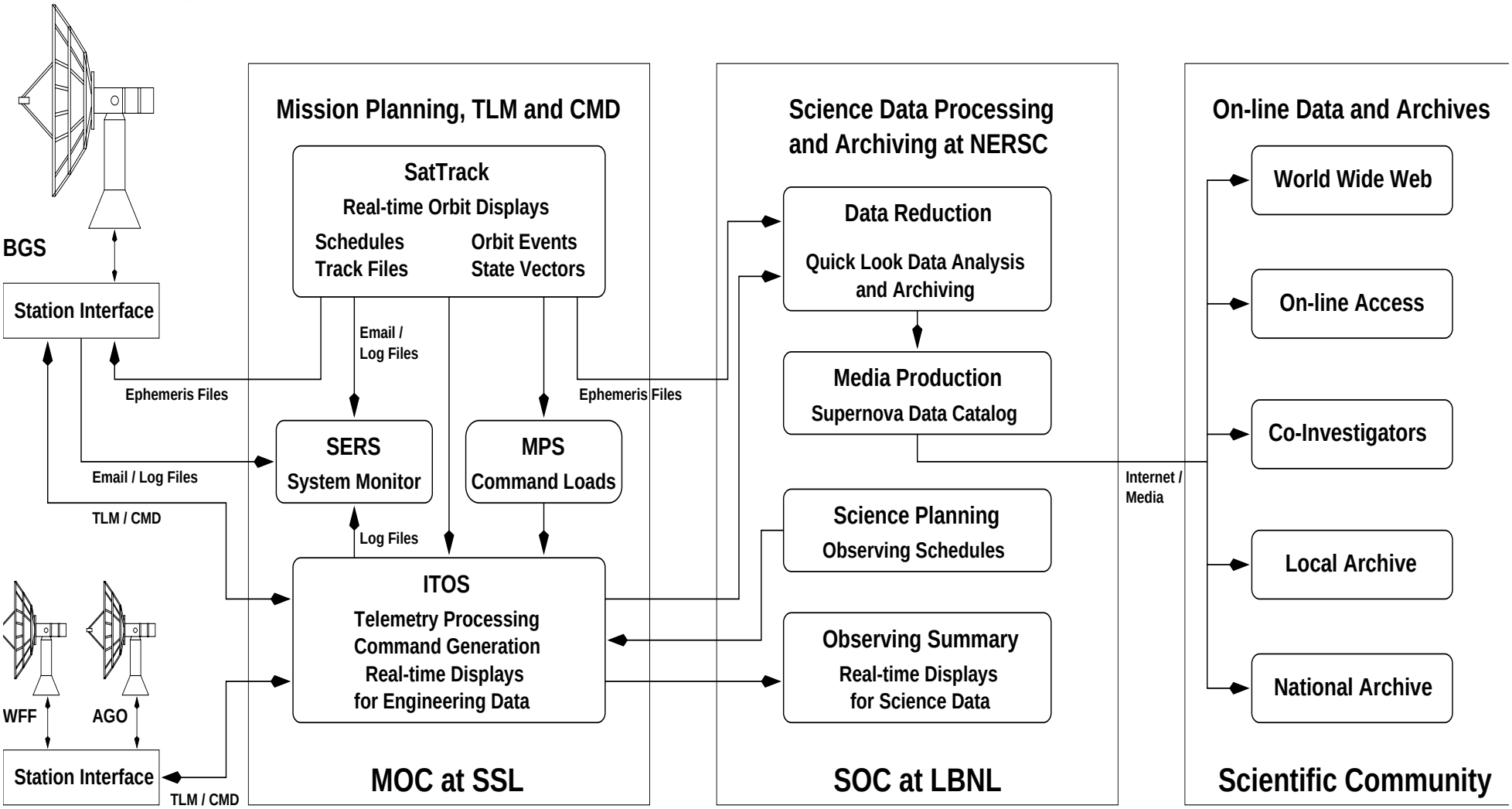
OBSERVATORY INTEGRATION and TESTING

- Detailed I&T Plan will be Developed During Study Phase

- Test Philosophy Includes:
  - Build Test Functions into Hardware
  - Perform System Level Tests as Early as Possible
    - e.g. Do Subsystem Interface Tests at Bread Board Level
  - Test End-to-End Whenever Possible
  - Ability to Support Tests is an Important Factor in Choice of Teaming Partners
- Strawman Plans Include:
  - Optics Testing Done by Optics Subcontractor
  - Spacecraft Contractor will Deliver a Fully Tested Spacecraft
  - Mechanical and Electrical Integration will be Done in an Appropriate Facility
  - Observatory Vibration and T/V Done in an Appropriate Facility
  - Final End-to-End Optical Test will be Done in an Appropriate Facility

MISSION OPERATIONS

- Mission Operations Center (MOC) at Space Sciences Using Berkeley Ground Station
  - Fully Automated System Tracks Multiple Spacecraft
- Science Operations Center (SOC) at Lawrence Berkeley Laboratory Built Around the National Energy Research Super Computer (NERSC)
  - Multiple Terabytes Data Storage
  - High Speed Links to CPU Farms & Supercomputers
  - Intensive Processing Done on Supercomputer with Final Analysis on PC's
- Operations are Based on a Four Day Period
  - Autonomous Operation of the Spacecraft
  - Coincident SOC Review of Data with Build of Next Target List
  - Upload Instrument Configuration for Next Period



SNAP Ground Data System

Data Flow Layout

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M.Bester, 19Nov99